SUPPLEMENTARY DATA

Improved electrochemical properties of morphology-controlled titania/titanate nanostructures prepared by in-situ hydrothermal surface modification of self-source Ti substrate for high-performance supercapacitors

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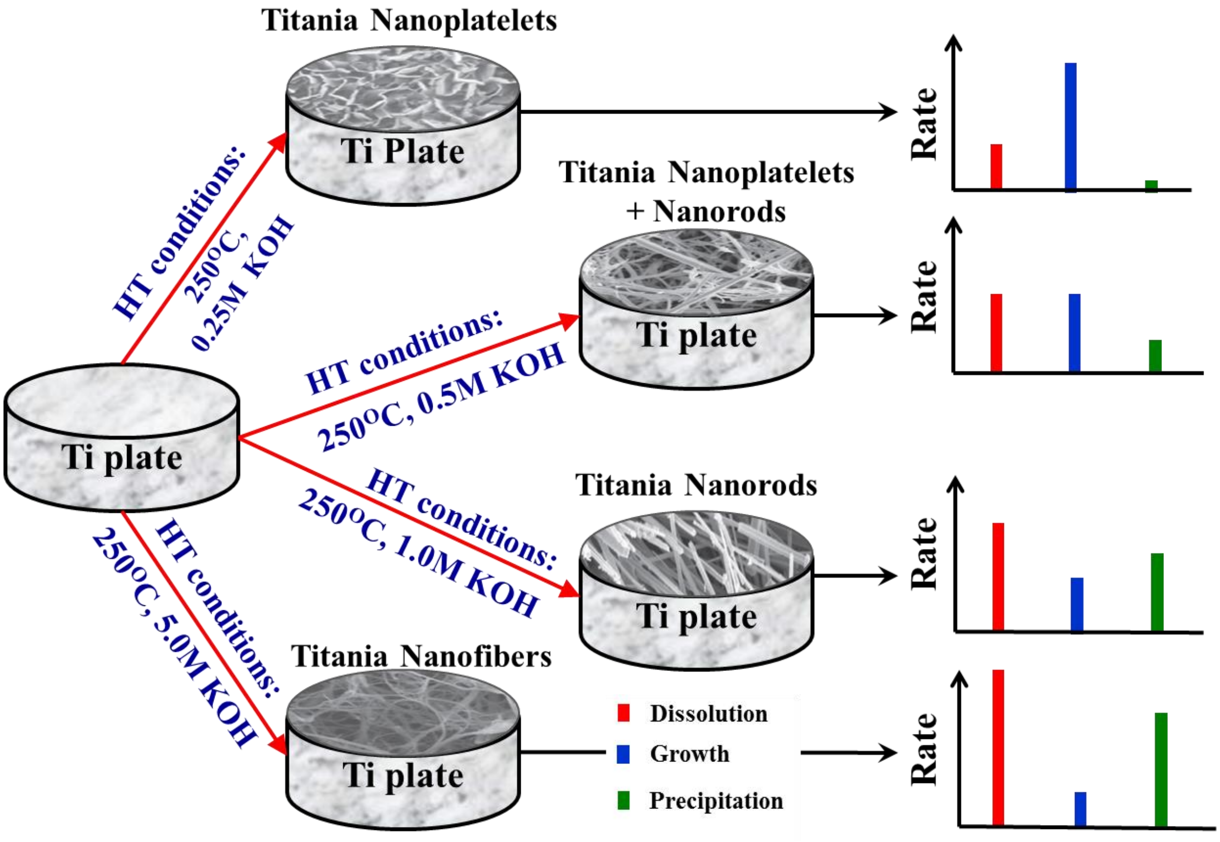

Figure S1: Schematic and pictorial representation of the hydrothermal synthesis of various titania nanostructures on the self-source Ti substrate under different KOH concentrations. Right-hand panel describes the relative dissolution, growth and precipitation rates of TiO_2 on the Ti substrate as a function of KOH concentrations.

Table S1: A comparison of the 2*θ*-values of different diffraction peaks observed in the XRD data (Fig. 2b) with the 1999 JCPDS-ICDD File. Also *d*-values of Rutile titania for (110) and (101) planes obtained from Fig. 3 and Fig. S2 are compared with 1999 JCPDS-ICDD File.

Peak origin		**$2\theta_{EXPT}$ (deg.)** (From Fig. 2b)	**$2\theta_{JCPDS}$** (1999 JCPDS-ICDD File)	**1999 JCPDS File Card #**
TiO (110)		35.6	35.9	12-0754
Rutile TiO_2	**(101)**	36.8	36.2	78-1510
	(202)	76.6	76.7	
Anatase TiO_2	**(200)**	48.0	48.1	84-1286
	(105)	53.6	53.9	
	(220)	70.7	70.3	
Ti		40.1	40.2	05-0682
		63.2	63.0	
		77.5	77.3	
K-Titanate		11.6	11.5	74-0275
		24.4	24.6	
		25.5	25.6	
		29.6	29.8	
Rutile TiO_2 (From TEM micrographs)		**$d_{110}\vert_{EXPT} = 0.33$ nm** (from Fig. 3)	**$d_{110}\vert_{JCPDS} = 0.324$ nm**	78-1510
		$d_{101}\vert_{EXPT} = 0.25$ nm (from Fig. S2)	**$d_{101}\vert_{JCPDS} = 0.248$ nm**	

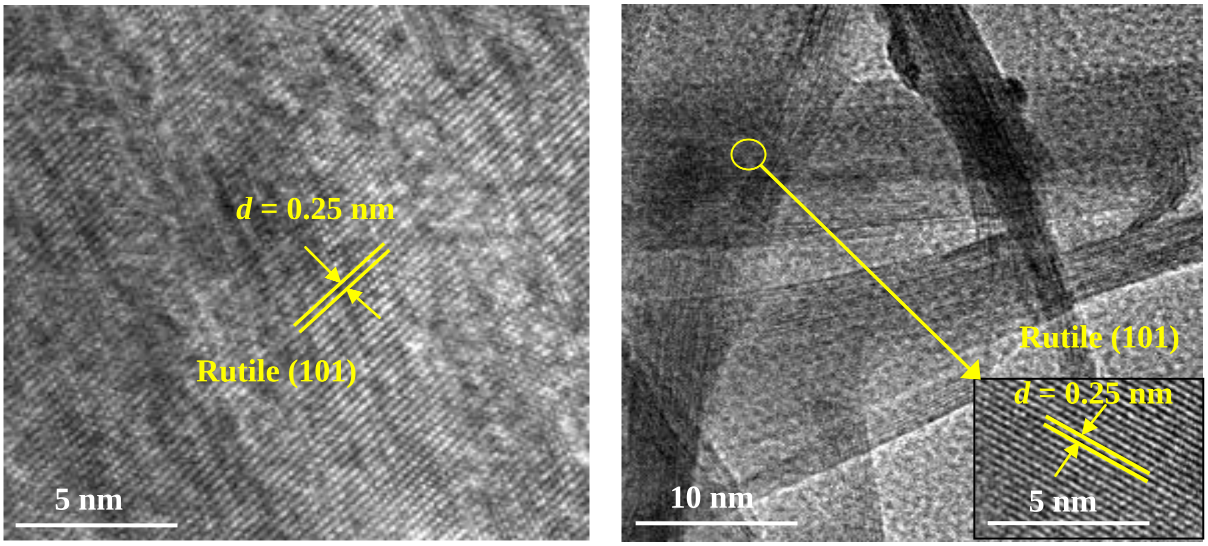

Figure S2: HRTEM micrographs of the interior of (a) titania platelet, (b) titania nanorods. The lattice spacing matches with the Rutile (101) planes with *d*-value around 0.25 nm.

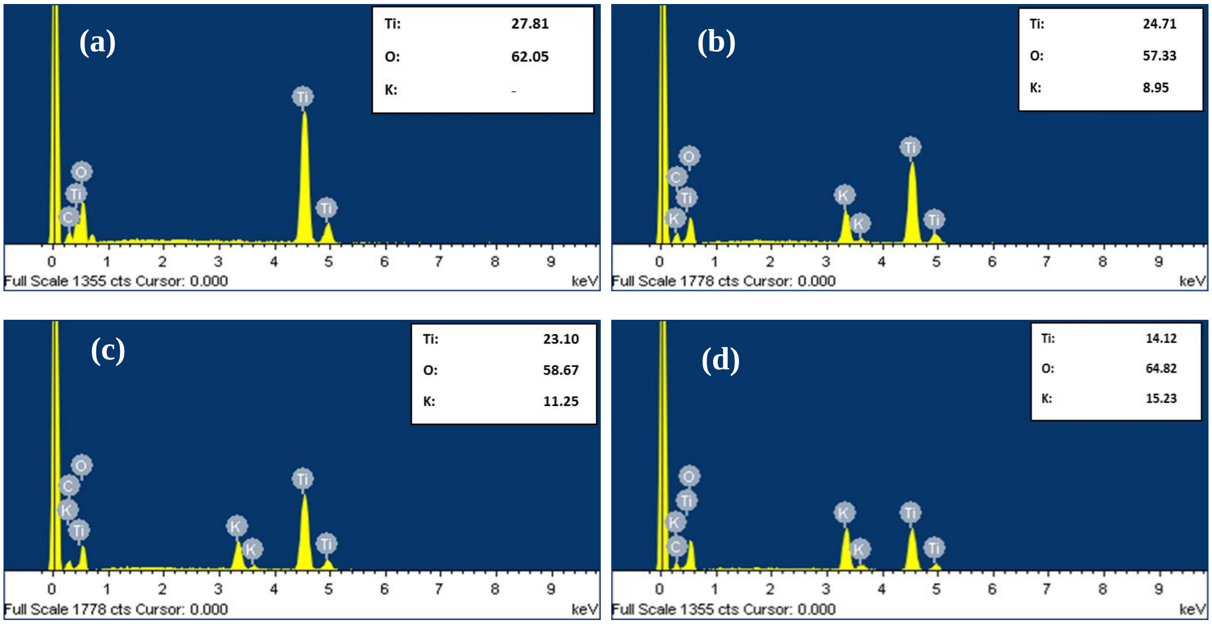

Figure S3: EDX micrograph of titania nanostructures hydrothermally prepared at (a) 0.25 M (2D platelets), (b) 0.5 M (2D platelets + 1D nanorods mixture), (c) 1.0 M (1D nanorods) and (d) 5.0 M KOH solutions (1D nanofibers). Insets represent the corresponding elemental composition.

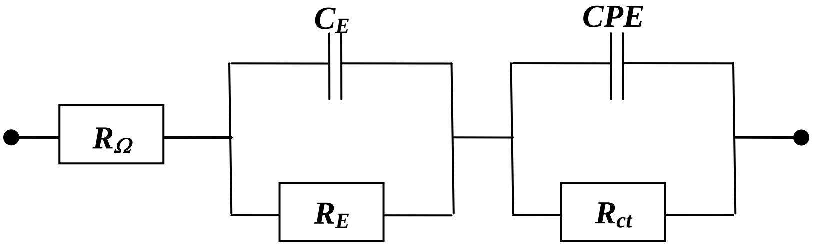

Figure S4: Equivalent circuit representation of Ti-TiO_2 nanostructured electrode. R_Ω: Resistance of the active medium (electrolyte), R_E: Charge flow resistance across Ti-TiO_2 interface, R_{ct}: Charge transfer resistance across TiO_2-Electrolyte interface, C_E: Capacitance of TiO_2, including surface states and Helmholtz double layer, *CPE*: Constant Phase Element defined by *CPE-T* {electrostatic capacitance, (in Farad)} and *CPE-P* {a fitting parameter, α, indicating the degree of deviation from a certain state, (dimensionless)}. For $\alpha = 0, 1, -1$, the *CPE* represents pure resistor, capacitor and inductor, respectively. For $\alpha \approx 0.5$, the CPE corresponds to Warburg impedance, *W* [1-3].

Table S2 EIS fitted data for all the samples according to the equivalent circuit shown in Fig. S4.

Samples	R_{Ω} (ohm)	C_E (μF)	R_E (ohm)	R_{ct} (ohm)	*CPE* (μF)	α
0.25M-TO (*2D platelets*)	2.11	66.5	753.1	9.56	6.99	0.62
0.5M-TO (*2D platelets + 1D nanorods*)	2.24	72.6	328.9	7.83	1.45	0.57
1.0M-TO (*1D nanorods*)	7.87	96.7	405.3	12.47	2.01	0.53
5.0M-TO (*1D nanofibers*)	4.63	208.7	676.6	12.09	2.96	0.50

References

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